



The destabilization of the Pilatte hut (2577 m a.s.l. - Ecrins massif, France), a paraglacial process?

Ludovic Ravanel (1), Laurent Dubois (2), Sébastien Fabre (2), Pierre-Allain Duvillard (1), and Philip Deline (1)

(1) Université de Savoie, Laboratoire EDYTEM, Le Bourget du Lac Cedex, France (ludovic.ravanel@univ-savoie.fr), (2) CEREMA, Direction territoriale Centre-Est, RRMS/Risques, Bron, France

The Pilatte hut is located at 2572 m a.s.l. at Saint-Christophe-en-Oisans (south of the Ecrins Massif, France), at a 3-hours-walk from La Bérarde hamlet. Its capacity is 120 beds for hikers and climbers who are engaged in the ascent of Les Bans (3669 m a.s.l.).

Built on a rocky ledge on the right side of the Pilatte Glacier ($A = 2.64 \text{ km}^2$; $L = 2.6 \text{ km}$), it currently dominates the glacier by about 150 m. This relief results from the retreat of the glacier since the end of the Little Ice Age, as the till around the hut was deposited during this stage. The glacier has lost about 1.8 km in length during the same period.

A first wooden hut was built in 1925 and presently serves as a winter refuge. In 1954, the growth of mountain activities led to the construction of a larger hut made of cemented stones. An extension to the west made of reinforced concrete was built in 1994. But in the late 1980s, severe damages to the 1954 part of the building were already recognized: vertical cracks lining the north and south facades, subsidence (c. 10 cm downstream) of the ground floor, cracked interior walls.

Currently, the evolution of the instability is monitored by several methods:

- since 2003, cracks in the building are surveyed by 25 Saugnac gauges, while an outside fracture in the rock is surveyed by a simple extensometer;
- since 2009, 8 strain gauges allow to annually measure displacements along the main fractures that delimit the unstable rock mass;
- a high-resolution topographic data set acquired by terrestrial laser scanning from the surface of the glacier in July 2014 has completed the monitoring.

The acting process is a translational slide of a rock mass with a volume of about 300 000 m³, initiated by the glacier shrinkage. Therefore, it has to be considered as a paraglacial process. Even if the slide velocity is presently decreasing, a demolition project of the hut is under consideration in favor of a new building on the right side of the valley, 800 m downstream the existing hut.